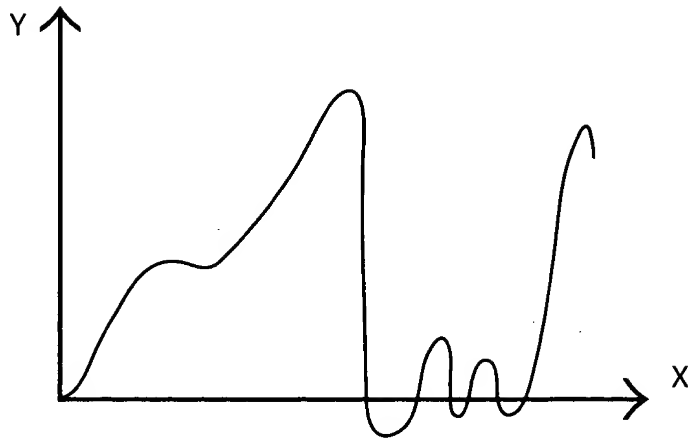
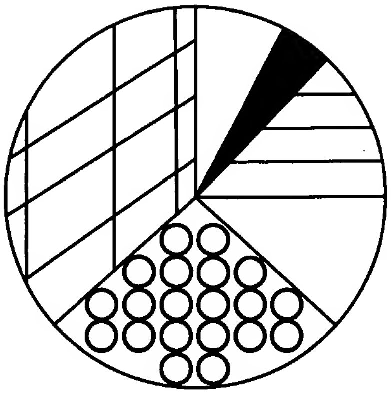
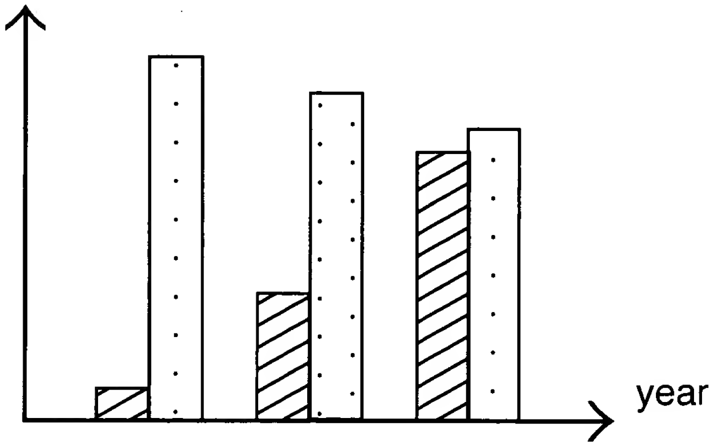


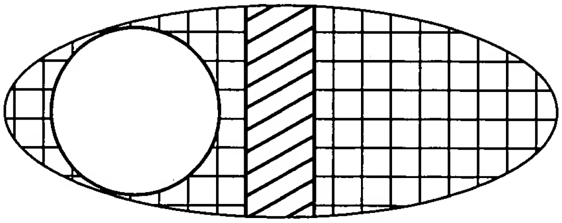
IFig-9A



IFig-9B



IFig-9C



IFig-9D

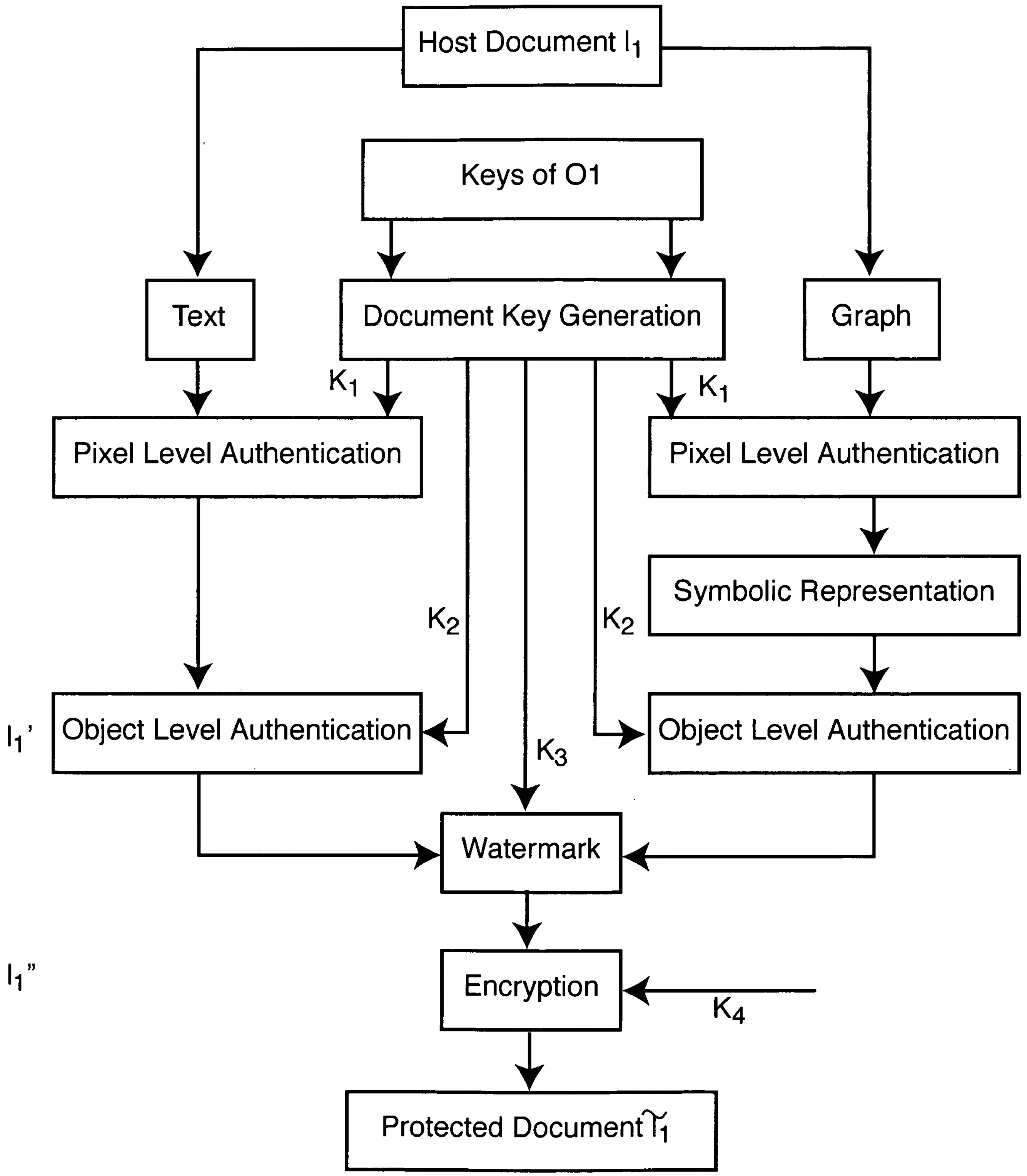

Host Document I_1
Keys of O1
Text
Document Key Generation
Graph
K_1
K_1
Pixel Level Authentication
Pixel Level Authentication
Symbolic Representation
K_2
K_2
I_1'
Object Level Authentication
Object Level Authentication
K_3
Watermark
I_1"
Encryption
K_4
Protected Document $\tilde{I}_1$

Fig-11

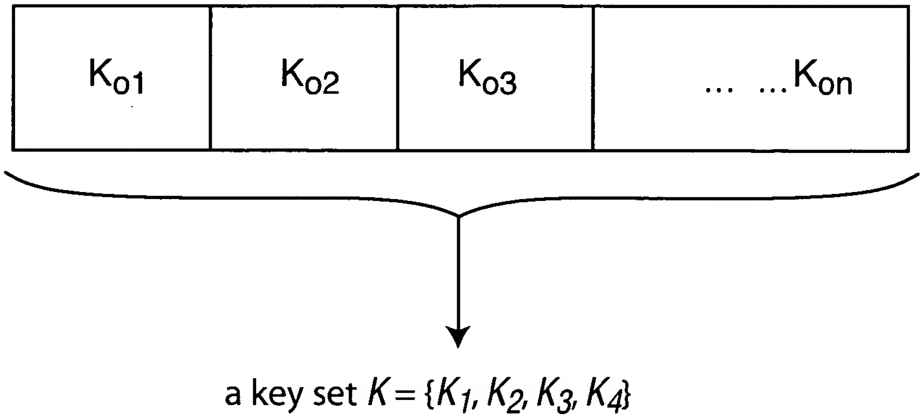


Fig-12

Relationship symbols	
< >	a tuple
∩	and
∪	or
≠	not
→	parent → child
⇒	sibling relation
⇔	twin relation
←	child ← parent
>	contain relation
|	condition
.	.
.	.
.	.
:	unconnected
Specification symbols	
&	size
#	shape
@	position
©	color

Fig-13

The system flow diagram is illustrated below. It shows the simplicity of the algorithm... "<N1{'Process A', #1, &reg, @mid}→N2{'Process B', #1, &reg, @mid}→N3{'If C', #3, &reg, @mid}→< N4{'End', #2, &reg, @mid}lyes; N2lno>>".

Fig-14

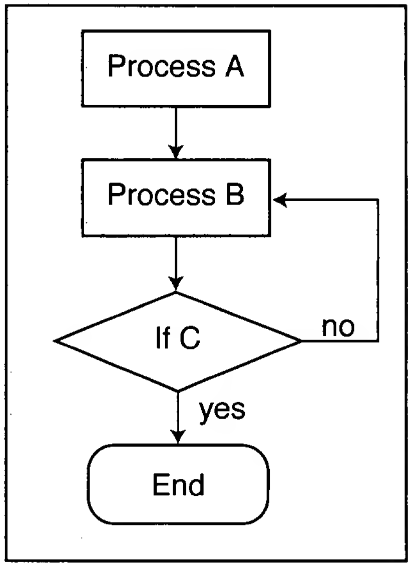


Fig-15

	W/o content-dependent one way hash		Our algorithms, w/ content-dependent one way hash		
(Text)	Traditional line spacing	Traditional serif length	Coalescing	Object level	Duel level with coalescing
Special coding	Needed	Needed	May or may not needed	May or may not needed	May or may not needed
Imperceptibility	Good	Good	OK	Good	Good
Detectability	Bad	Bad	OK	Good	Good
Pixel-level detectability	Bad	Bad	Good if Method I OK if Method II	Can't detect	OK
Localization-ability	Bad	Some bad. Some OK	OK	Good	Good
Copy and print	Bad	Bad	Good if Method I, bad if Method II	Good	Good
Noise resistance-ability	Bad	OK	Good if Method I, bad if Method II	Good	Good
Robustness to scaling	Good	OK	Good if Method I, bad if Method II	Good	Good

Fig-18

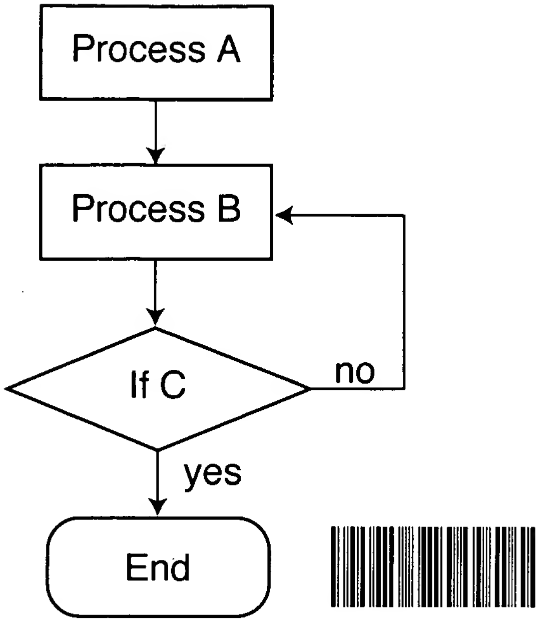
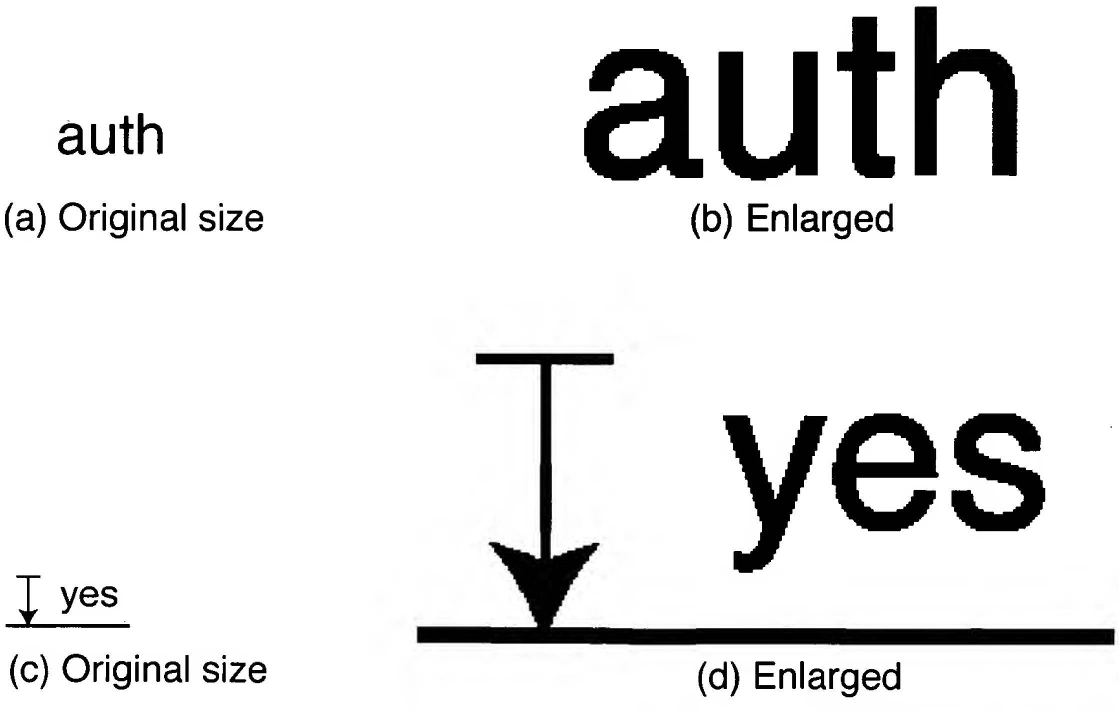


Fig-16



(a) Original size

(b) Enlarged

(c) Original size

(d) Enlarged

Fig-17